

**Table 2.4-1 1990
Total population and
Population Density
by Municipality**

MUNICIPALITY	AREA SQ. MILE	1990 POPULATION TOTAL	1990 POPULATION DENSITY
Morris County			
Jefferson Twp	42.348	17825	421
Passaic County			
West Milford Twp	80.010	25430	318
Sussex County			
Montague Twp	46.101	2832	61
Wantage Twp	67.257	9487	141
Vernon Twp	70.804	21211	300
Frankford Twp	35.293	5114	145
Sussex Boro	0.621	2201	3544
Hardyston Twp	32.579	5275	162
Lafayette Twp	18.342	1902	104
Hamburg Boro	1.153	2566	2225
Franklin Boro	4.559	4977	1092
Sparta Twp	39.970	15157	379
Ogdensburg Boro	2.289	2722	1189
Andover Twp	20.862	5438	261
Byram Twp	21.708	8048	371

**Table 2.4-2a
Historic Total
Population By
Municipality**

MUNICIPALITY	POPULATION						
	1930	1940	1950	1960	1970	1980	1990
Andover Twp.	496	591	1,052	2,177	3,040	4,506	5,438
Byram Twp.	245	373	761	1,616	4,592	7,502	8,048
Frankford Twp.	1,074	1,244	1,530	2,170	2,777	4,654	5,114
Franklin Boro	4,176	4,009	3,864	3,624	4,236	4,486	4,977
Hamburg Boro	1,160	1,116	1,305	1,532	1,820	1,832	2,566
Hardyston Twp.	946	1,034	1,279	2,206	3,499	4,553	5,275
Lafayette Twp.	735	803	836	1,100	1,202	1,614	1,902
Montague Twp.	581	621	602	879	1,131	2,066	2,832
Ogdensburg Boro	1,138	1,165	1,169	1,212	2,222	2,737	2,722
Sparta Twp.	1,316	1,729	3,021	6,717	10,819	13,333	15,157
Sussex Boro	1,415	1,478	1,541	1,656	2,038	2,418	2,201
Vernon Twp.	1,279	1,407	1,548	2,155	6,059	16,302	21,211
Wantage Twp.	2,075	2,376	2,543	3,308	4,329	7,268	9,487
Jefferson Twp.	1,254	1,548	2,744	6,884	14,122	16,413	17,825
West Milford Twp.	1,901	2,501	3,650	8,157	17,304	22,750	25,430

Table 2.4-2b
Change in Total
Population Over
Time

MUNICIPALITY	CHANGE IN POPULATION		PERCENT CHANGE	
	change 1970-1990	%change 1970-1990	change 1980-1990	%change 1980-1990
Andover Twp.	2398	79%	932	21%
Byram Twp.	3456	75%	546	7%
Frankford Twp.	2337	84%	460	10%
Franklin Boro	741	17%	491	11%
Hamburg Boro	746	41%	734	40%
Hardyston Twp.	1776	51%	722	16%
Lafayette Twp.	700	58%	288	18%
Montague Twp.	1701	150%	766	37%
Ogdensburg Boro	500	23%	-15	-1%
Sparta Twp.	4338	40%	1824	14%
Sussex Boro	163	8%	-217	-9%
Vernon Twp.	15152	250%	4909	30%
Wantage Twp.	5158	119%	2219	31%
Jefferson Twp.	3703	26%	1412	9%
West Milford Twp.	8126	47%	2680	12%

Table 2.4-3 Population Projections By Municipality

MUNICIPALITY	POPULATION					
	1990	2005*	2010*	2020 *	Population Change	Percent Change
Jefferson Twp.	17825	21144	20737	22517	4692	26%
West Milford Twp.	25430	29457	35533	40901	15471	61%
Andover Twp.	5438	5493	6853	7786	2348	43%
Byram Twp.	8048	8238	8276	8987	939	12%
Frankford Twp.	5114	6853	6749	8069	2955	58%
Franklin Boro	4977	4830	5360	5729	752	15%
Hamburg Boro	2566	3855	4316	4969	2403	94%
Hardyston Twp.	5275	5904	6970	7998	2723	52%
Lafayette Twp.	1902	1753	2111	2555	653	34%
Mantague Twp.	2832	3855	3931	4621	1789	63%
Ogdensburg	2722	2129	2280	2309	-413	-15%
Sparta Twp.	15157	15228	16871	18557	3400	22%
Sussex Boro	2201	1916	1861	1766	-435	-20%
Vernon Twp.	21211	29442	30209	34896	13685	65%
Wantage Twp.	9487	10721	11039	13133	3646	38%
Note: * - 1994 NJDOT Baseline Trend						

**Table 2.4-4 Historic and Projected
Total Population by Municipality**

MUNICIPALITY	POPULATION									
	1930	1940	1950	1960	1970	1980	1990	2005 [†]	2010 [†]	2020 [†]
Andover Twp.	496	591	1,052	2,177	3,040	4,506	5,438	5493	6853	7786
Byram Twp.	245	373	761	1,616	4,592	7,502	8,048	8238	8276	8987
Frankford Twp.	1,074	1,244	1,530	2,170	2,777	4,654	5,114	6853	6749	8069
Franklin Boro	4,176	4,009	3,864	3,624	4,236	4,486	4,977	4830	5360	5729
Hamburg Boro	1,160	1,116	1,305	1,532	1,820	1,832	2,566	3855	4316	4969
Hardyston Twp.	946	1,034	1,279	2,206	3,499	4,553	5,275	5904	6970	7998
Jefferson Twp.	1,254	1,548	2,744	6,884	14,122	16,413	17,825	21144	20737	22517
Lafayette Twp.	735	803	836	1,100	1,202	1,614	1,902	1753	2111	2555
Montague Twp.	581	621	602	879	1,131	2,066	2,832	3855	3931	4621
Ogdensburg Boro	1,138	1,165	1,169	1,212	2,222	2,737	2,722	2129	2280	2309
Sparta Twp.	1,316	1,729	3,021	6,717	10,819	13,333	15,157	15228	16871	18557
Sussex Boro	1,415	1,478	1,541	1,656	2,038	2,418	2,201	1916	1861	1766
Vernon Twp.	1,279	1,407	1,548	2,155	6,059	16,302	21,211	29442	30209	34896
Wantage Twp.	2,075	2,376	2,543	3,308	4,329	7,268	9,487	10721	11039	13133
West Milford Twp.	1,901	2,501	3,650	8,157	17,304	22,750	25,430	29457	35533	40901
[†] 1994 NJDOT Baseline Trend Data										

Excerpted from : **1998 IDENTIFICATION AND SETTING OF PRIORITIES FOR SECTION 303(d) WATER QUALITY LIMITED WATERS IN NEW JERSEY. NJDEP Sept 15, 1998**

NOTES:

- Reach numbers with parentheses around the last three digits do not have their own reach number but have been identified by the reach number of the reach to which they are tributary.
- Numbers preceding watershed names refer the watershed numbers illustrated in Figure 1.
- Watershed are aggregated by Watershed Management Areas (WMA) denoted in Figure 2.
- Letters in parentheses, (H, M, L) denote ranking for TMDL determinations: High, Medium, Low.
- Entries in **bold** denote additions to the Final List which were not present in the proposed draft. These additions are oversights and should have been present in earlier 303(d) Lists and carried over to this 1998 List.
- River Reach File 3 codes for macroinvertebrate monitoring sites and 314 lakes are listed in Appendix B.
- Comment fields will denote candidates for delisting, either full or partial (see section III of is Report).
- Key for the information sources delineated under the column labeled *Data Source* are as follows:
 - A. Based on 304 (l) Mini List waterbodies
 - B. In-stream macroinvertebrate assessments
 - C. Fixed-location physical/chemical monitoring
 - D. Shellfish-growing water classification monitoring
 - E. Fish tissue analysis
 - F. New York-New Jersey Harbor Estuary Program
 - G. Delaware Estuary Program
 - H. Clean Lakes Program
 - I. Site Specific Intensive Monitoring

APPENDIX A

Sub-list 1

Known Water Quality Impairment: Violations of SWQS known or expected.

- Violations of chemical/physical criteria (minus metals and ammonia)
- Violations of chemical/physical criteria obtained from the Harbor Estuary Programs (minus metals)
- Fish and shellfish consumption advisories
- Shellfish harvesting restrictions
- Public lakes having undergone detailed assessments under the Clean Lakes Program

Wallkill, Passaic and Hackensack River Watersheds

Watershed: 3 Papakating Creek WMA 2 (M)

Waterbody Name	Reach #/Location	Pollutant/Impact: Water Quality Violation	Pollutant/Impact: Biological	Use Impairment	Comments	Data Sour
Papakating Creek	02020007-027-020/at Sussex	fecal coliform, total phosphorus		Primary Contact, Aquatic Life Support		C

Watershed: 5 Pochuck Creek WMA 2 (L)

Waterbody Name	Reach #/Location	Pollutant/Impact: Water Quality Violation	Pollutant/Impact: Biological	Use Impairment	Comments
Black Creek	02020007-031-040/nr Vernon	fecal coliform, total phosphorus		Primary Contact Aquatic Life Support	

Watershed: 2 Wallkill River WMA 2 (M)

Waterbody Name	Reach #/Location	Pollutant/Impact: Water Quality Violation	Pollutant/Impact: Biological	Use Impairment	Commen
Wallkill River	02020007-028-010/at Franklin	temperature, fecal coliform, total phosphorus		Primary Contact, Aquatic Life Support	
Wallkill River	02020007-026-030/nr Sussex	fecal coliform, total phosphorus		Primary Contact, Aquatic Life Support	
Wallkill River	02020007-026-030/nr Unionville	fecal coliform, total phosphorus		Primary Contact, Aquatic Life Support	

APPENDIX A

Sub-list II: Candidate TMDL Waters Sub-List

A. Known Water Quality Impairment Sub-list

Use Impairment Known - Violations of SWQS not known

- All Severely Impaired AMNET sites
- AMNET sites indicating the presence of toxic substances

Wallkill, Passaic and Hackensack River Watersheds

Watershed: 3 Papakating Creek WMA 2 (M)

Waterbody Name	Reach #/Location	Pollutant/Impact: Water Quality Violation	Pollutant/Impact: Biological	Use Impairment	Comments
Papakating Ck	02020007-027 West Br		unknown toxicity	Aquatic Life Support	
Clove Brook	02020007-027		unknown toxicity	Aquatic Life Support	

APPENDIX A

Sub-list II: Candidate TMDL Waters Sub-List

B. Suspected Water Quality Impairment Sub-List

Use Impairment Not Known – confirmation needed

- Moderately impaired AMNET sites
- 304(l) listings
- Metals and ammonia violations recorded through ambient monitoring
- Heavy metal violations obtained through the Harbor Estuary Programs
- Public lakes having undergone cursory assessments under the Clean Lakes Program

Wallkill, Passaic and Hackensack River Watersheds

Watershed: 3 Papakating Creek WMA 2 (M)

Waterbody Name	Reach #/Location	Pollutant/Impact: Water Quality Violation	Pollutant/Impact: Biological	Use Impairment	Comments
Papakating Ck	Rt 565, Pelletstown		moderately impaired	Aquatic Life Support	
Clove R	Loomis Ave, Sussex		moderately impaired	Aquatic Life Support	

Watershed: 5 Pochuck Creek WMA 2 (L)

Waterbody Name	Reach #/Location	Pollutant/Impact: Water Quality Violation	Pollutant/Impact: Biological	Use Impairment	Comments
Lk Lookout Bk	Wawayanda St Pk, Wawayanda		moderately impaired	Aquatic Life Support	

Watershed: 2 Wallkill River WMA 2 (M)

Waterbody Name	Reach #/Location	Pollutant/Impact: Water Quality Violation	Pollutant/Impact: Biological	Use Impairment	Comments
Wallkill River	02020007-028	arsenic, beryllium, cadmium, chromium, lead, mercury		Aquatic Life Support	
Wallkill River	02020007-026	lead		Aquatic Life Support	
Beaver Run	Cemetery Rd, Wantage Twp		moderately impaired	Aquatic Life Support	

- The following are public lakes assessed by the Clean Lakes Program as use-impaired but the sources of pollution are as yet not determined. Water quality data for many of these lakes are old, with assessments having been performed in the late 1970's and early 1980's. Other lakes in this listing are judged to be impaired based upon cursory surveys covering only a single year of data collection.

Clove Lake

Lake Waywayanda

Appendix 3.6-2: Preliminary TMDL Parameter Recommendations for WMA02

Division of Science, Research and Technology
401 East State Street, PO Box 409
Trenton, New Jersey 08625-0409

MEMORANDUM

TO: Ken Klipstein, Chief, Upper Delaware Water Region, DWM

FROM: Karen Schaffer, Team Lead, Water Assessment Team, DSRT
Kevin Berry, Water Assessment Team, DSRT

SUBJECT: Preliminary TMDL Parameter Recommendations for WMA02

DATE: October 6, 1999

As requested, the Water Assessment Team has developed preliminary recommendations for parameters to consider in the WMA02 TMDL project. These recommendations were developed based on review of 1998 Impaired Waterbodies List (303d List), Ambient Stream Monitoring Network status data for pH, TP, DO, and FC from the 1992 through 1998. (USGS, Water Resources Data, Water Year 199X). Trends analyses for flow, TP, DO, FC, and NO₃ were obtained from USGS and Coastal Environmental Services (USGS, 1999; CES, 1997).

Recommendations Summary

Note that the recommendations provided are preliminary, pending SWQS determinations for TP and pending receipt of 303d Evaluation Monitoring Data. Development of these recommendations is described in detail in Attachment 1.

Total Phosphorus . (Note that de-listing discussed below does not preclude consideration of TP from the TMDL project.)

- **Wallkill River:** No further actions are recommended at Sparta; new data are needed at Franklin to develop TMDL recommendations; de-listing can be proposed based on existing data at Sussex and Unionville
- **Papakating Creek:** TMDL development is recommended based on historical exceedences and currently elevated levels.
- **Black Creek:** De-listing can be proposed based on existing data from Vernon
- **Double Kill:** No further actions are recommended at Wawayanda.

Nitrate: Due to levels indicative of human disturbance and increasing concentration trends, it may be appropriate to include NO₃ in the Wallkill from Sussex to Unionville as a proactive component of the TMDL project.

Pathogen Indicators (Fecal Coliform, Enterococcus). Nonpoint source management of pathogen indicators is recommended throughout the WMA.

Metals: Recommendations will be developed based on 303d Evaluation Monitoring data. Beryllium can be proposed for de-listing statewide due to lack of a SWQS criteria.

Dissolved Oxygen: Diurnal monitoring is recommended in the Wallkill at Unionville and Papakating at Sussex due to periodically depressed levels and historical excursions of the SWQS criteria.

Temperature: Recommendations will be developed for the Wallkill at Franklin based on 303d Evaluation Monitoring data.

pH: No further action is recommended.

I hope these preliminary recommendations are useful. I am looking forward to receipt of the 303d Evaluation Monitoring data for this WMA and SWQS information to finalize the recommendations. Also, status and trends data on additional parameters are available, and can be assessed if needed based on recommendations from DWM, DWQ or others.

Attachments

Attachment 1: Development of Preliminary TMDL Recommendations for WMA02

Table 2: SWQS criteria for selected conventionals and metals

Table 3: Preliminary 303d Recommendations in WMA02

Figure 1: Monitoring locations in WMA02

cc:

Leslie McGeorge, Director, DSRT

Lance Miller, Director, DWM

Jeff Reading, DWQ

Al Korndoerfer, Chief, Freshwater and Biological Monitoring, DWM

Phil Liu, Team Lead, Watershed Modeling Team, DWM

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Attachment 1: Development of Preliminary TMDL Recommendations for WMA02

Background Information

The 1998 Impaired Waterbodies List (303d List) provides the starting point for TMDL development. This list is based upon ambient water quality data collected in recent years and impaired waterbodies carried over from earlier Impaired Waterbodies Lists, including 304(l) and 1992, 1994 and 1996 303(d) Lists.

The 304(l) List pre-dated the 303d Lists and was based on potential exceedences of Surface Water Quality Standards for toxics discharged from point sources. The 304(l) List was developed using effluent data and ambient water quality data have not been collected to evaluate 304(l) listings. Federal regulations require that existing lists form the basis for the updated list. Thus, reaches may have been listed based on effluent and/ or water quality data collected from the mid-1980's through 1995.

Reaches with ambient water quality data were typically listed if more than 5% of the samples collected in a 5 year period exceeded applicable SWQS criteria. Table 1 summarizes chemical listing for the 1998 Impaired Waterbodies List (303d)

Table 1: 1998 Impaired Waterbodies List for WMA02 (chemical listings only)

Reach	Pollutants
Papakating Creek at Sussex	fecal coliform, total phosphorus
Black Creek near Vernon	fecal coliform, total phosphorus
Wallkill River at Franklin	temperature, fecal coliform, total phosphorus, arsenic, beryllium, cadmium, chromium, lead, mercury *
Wallkill River near Sussex	fecal coliform, total phosphorus, lead *
Wallkill River near Unionville	fecal coliform, total phosphorus, lead *
Note: metals are from 304(l) list and the reach, not specific monitoring location, is listed on 303d	

Data Review and Preliminary Recommendations

USGS Water Year Reports were reviewed for exceedences of SWQS at stations sampled in the Ambient Stream Monitoring Network. Additional data (3 samples at base flow) have been collected as part of the 303d Evaluation Monitoring program. Results for WMA02 are pending from Department of Health and Senior Services laboratory. The purpose of this monitoring is to evaluate current concentrations of metals and nutrients for 303d listed reaches with out-dated data and to estimate the spatial extent of TMDL projects. Since FC exceedences are wide-spread and are proposed to be managed through nonpoint source controls, FC was not included in 303d Evaluation Monitoring.

Given current EPA policy to de-list based on comparable data used for listing, the most recent 5 Water Years of data were reviewed. (Water Year is equivalent to Federal Fiscal Year- 10/97 through 9/98 is Water Year 98). If less than 5% of samples exceed applicable criteria in the previous 5 years (including Ambient Stream Monitoring Network data and 303d Evaluation Monitoring data), de-listing will be proposed in the 2000 303d List. SWQS criteria for selected conventionals and metals are summarized on Table 2. Trends reports by USGS (1998) and Coastal Environmental Services (1997) were reviewed to evaluate likely future conditions. Results are summarized below and on Table 3. Station numbers are included to facilitate reference to USGS and CES reports.

The following recommendations may be modified based on pending SWQS classification and TP criterion information for 3 stations from the SWQS Team. Modifications may also be needed pending receipt and analysis of 303d Evaluation Monitoring data. Therefore, these recommendations are preliminary.

NOTES: All evaluation dates are inclusive; Water Year = Federal Fiscal Year (WY98 = 10/97-9/98)

01367625 Wallkill at Sparta (FW2-NT, TP 0.1 mg/l)

This location was added to the ASMN as a Forest Land Use Indicator station in WY 98.

Results of Data Review:

- COMPLIANCE: Review of WY98 (i.e., 10/97-9/98) data (n=4) show compliance with SWQS for Temp, pH, DO, NO3, TP.
- PATHOGEN INDICATORS: FC and EC exceeded the SWQS criteria. This location is not on the 1998 303d List.

Recommendation: Efforts to manage FC and EC in the Wallkill River should include this reach. Review WY 99 data to determine if FC and EC should be added to the 2000 303d List.

01367700 Wallkill at Franklin (FW2-NT, TP 0.1 mg/l)

This location is included on the 1998 303d List for Temp, FC, TP, As, Be, Cd, Cr, Pb, Hg.

Results of Data Review: This location was monitored through 1990. Review of WY90 (i.e., 10/89-9/90) data (n=4) showed SWQS criteria for Temp, pH, DO, NO3 and TP were met and exceedences of FC and EC occurred. Current concentrations of conventionals and metals are being assessed through 303d Evaluation Monitoring.

Recommendations: Base recommendations on 303d Evaluation Monitoring data. De-list Be (statewide) due to lack of SWQS criterion.

01367770 Wallkill at Sussex (FW2-NT, TP 0.1 mg/l)

This location is included on the 1998 303d List for FC, TP, Pb. This location was included in the previous ASMN (1976-1997) and is monitored in the redesigned ASMN as a Watershed Integrator station (1997-98). Current concentrations of conventionals and metals are being evaluated through 303d Evaluation Monitoring.

Results of Data Review:

- COMPLIANCE: Review of WY 94-98 data (n=24) show compliance with SWQS criteria for Temp, pH, DO, NO3, TP. Statistically significant trends in DO, TP, FC concentrations were not found by USGS or CES.
- TP: There was 1 exceedence (0.15 mg/l TP, 4% of 24 samples) of the TP criterion of 0.1 mg/l in the 1993-94 Water Year.
- NO3: Maximum NO3 concentrations in WY 94-98 were between 1.15 mg/l NO3 and 2.7 mg/l NO3. Nationally, 3 mg/l is considered indicative of human contributions in non-coastal watershed (M. Ayers, pers. comm.) In addition, CES found a statistically significant increasing trend in NO3 concentrations between 1975 and 1994. USGS did not identify a NO3 trend between 1986 and 1995.
- PATHOGEN INDICATORS: Criteria for FC and EC were exceeded.

Recommendations: Propose de-listing for TP; base recommendations for Pb on 303d Evaluation Monitoring data. Proactive TMDL efforts should consider NO3 in this reach. Efforts to manage FC and EC in the Wallkill River should include this reach.

01368000 Wallkill at Unionville (FW2-NT, TP 0.1 mg/l)

This location is included on the 1998 303d List for FC, TP, Pb. This location was included in the previous ASMN (1963-78, 1991-97) and was discontinued in the redesigned ASMN. Current concentrations of conventionals and metals are being evaluated through 303d Evaluation Monitoring.

Results of Data Review:

- COMPLIANCE: Review of WY 93-97 data (n=25) showed compliance with Temp, pH and NO3 SWQS criteria.

- DO: One sample in WY 93 exceeded the SWQS for DO (4% of 25 samples). A value of 4.5 mg/l DO was recorded, and a second sample in WY 95 approached the SWQS criteria with a value of 5.1 mg/l DO. In WY 97, the DO range was 6.0-12.7 mg/l. USGS and CES did not identify statistically significant trends in DO concentrations.
- TP: One sample (0.2 mg/l) in WY 93 exceeded the TP criterion (0.1 mg/l, 4% of 24 samples) and CES identified a statistically significant increasing trend in TP concentrations (1975-94). USGS did not identify a trend (1986-95). TP concentrations have approached, but not exceeded, the SWQS for TP in WY 96 and 97.
- NO3: NO3 concentrations above 2 mg/l were found in WY 96 and 97 and USGS identified a statistically significant increasing trend.
- PATHOGEN INDICATORS: Concentrations of FC and EC exceeded SWQS in all 5 years and USGS and CES did not identify statistically significant trends.

Recommendations: Propose de-listing for TP, base recommendations for Pb on 303d Evaluation Monitoring data. Diurnal DO data would be useful at this location. Proactive TMDL efforts should consider NO3 in this reach. Efforts to manage FC and EC in the Wallkill River should include this reach.

01367860 Papakating Creek near Sussex (FW2-NT, TP 0.1 mg/l)

This location was included in the redesigned ASMN (WY 98) as a Agricultural Land Use Indicator and Statewide Status station. This location is included in 303d Evaluation Monitoring.

Results of Data Review:

- COMPLIANCE: Review of WY 98 data (n=4) show compliance with SWQS criteria for Temp, pH, DO, NO3, TP. TP ranged from 0.02 to 0.06 mg/l TP.
- PATHOGEN INDICATORS: Criteria for FC and EC were exceeded.

Recommendations: Additional evaluation is needed to determine if TP from this reach, and upstream, contribute to historical exceedences and currently elevated concentrations in the downstream station (01367910). Include in TMDL. Additional FC and EC data are needed to determine if downstream 303d listings for FC should be extended up to this reach. Efforts to manage FC and EC in the Papakating Creek should include this reach.

01367910 Papakating Creek at Sussex (FW2-NT, TP 0.1 mg/l)

This location is included on the 1998 303d List for FC and TP. This location was included in the previous ASMN (1976-1997) and was discontinued in the redesigned ASMN. This location is addressed in 303d Evaluation Monitoring through upstream station 01367860 Papakating Creek near Sussex.

Results of Data Review:

- COMPLIANCE: Review of WY 93- 97 data (n=25) show compliance with SWQS criteria for Temp, pH and NO3.
- DO: One DO sample (4.5 mg/l DO, 4% of 25 samples) exceeded the SWQS of 5 mg/l in WY 93. In WY 97 values ranged from 5.8 to 13.4 mg/l DO. USGS identified a statistically significant increasing DO concentration trend (1986-95); CES did not identify a DO trend (1975-1994).

- TP: The TP criterion of 0.1 mg/l TP was exceeded in 1 sample collected during 1992-93, in 2 samples per year in WY 94-96, and approached but did not exceed the SWQS criterion in WY 97. TP in WY 97 ranged from 0.02 to 0.09 mg/l TP. USGS found a statistically significant decreasing TP concentration trend (1986-95); CES did not find a statistically significant TP trend.
- NO3: NO3 levels were below 2 mg/l during the review period, but CES found a statistically significant increasing concentration trend (1975-94). USGS did not identify a NO3 trend at this location (1986-95).
- PATHOGEN INDICATORS: FC and EC criteria were exceeded in all 5 years.

Recommendations: Use 303d Evaluation Monitoring data to develop a recommendation for TP. Efforts to manage FC and EC in the Papakating Creek should include this reach. Collection of diurnal DO data is recommended to better characterize DO.

01368950 Black Creek at Vernon (FW2-NT, TP 0.1 mg/l)

This location is included on the 1998 303d List for FC and TP. This location was included in the previous ASMN (1976-1997) and was discontinued in the redesigned ASMN. This location is included in 303d Evaluation Monitoring.

Results of Data Review:

- COMPLIANCE: Review of data collected WY 93-97 data (n=25) showed compliance with SWQS criteria for Temp, pH and NO3.
- DO: One sample (3.8 mg/l DO) exceeded the DO criteria of 5 mg/l DO in WY 95. In WY 97, measured DO concentrations ranged from 6.5-11.2 mg/l DO.
- TP: One sample (0.16 mg/l TP, 4% of 25 samples) exceeded the TP criteria of 0.1 mg/l TP in WY 95 and a value of 0.9 mg/l TP occurred in WY 97. USGS found a statistically significant decreasing TP concentration trend.
- NO3: Levels of NO3 were below 1.5 mg/l NO3, and no trends were found.
- PATHOGEN INDICATORS: Exceedences of FC and EC occurred in all 5 years and USGS did not identify a statistically significant concentration trend.

Recommendation: Propose de-listing for TP. Due to recent elevated result, use 303d Evaluation Monitoring data to develop a TMDL recommendation for TP. Efforts to manage FC and EC in the Black Creek should include this reach.

01668820 Double Kill at Wawayanda (FW1?)

This location was included in the redesigned ASMN in WY 98 as one of 6 reference locations in the state. (This station should be located in FW1 water)

Results of Data Review:

- COMPLIANCE: Review of WY 98 data (n=4) for show compliance with numerical SWQS criteria for Temp, pH, DO, NO3, TP. Since FW1 waters are also precluded from changes in water quality except toward natural conditions, trend evaluations are needed to ensure compliance with SWQS.
- PATHOGEN INDICATORS: FC and EC show compliance with all numerical SWQS criteria except EC.

Recommendations: Efforts to manage EC in the Double Kill should include this reach. Evaluate additional data to determine if this reach should be listed for EC. Once sufficient data are collected, evaluate trends for compliance with SWQS.

References:

Ayers, M., USGS, NAWQA Program Lead, Sept. 22, 1999, *pers. comm.*

Coastal Environmental Services (CES), 1997. Statistical Analyses of Trends in Water Quality Stations in the Ambient Streams Monitoring Program.

United States Geological Survey (USGS), 1999. Trends in Water Quality of New Jersey Streams, Water Years 1986-95. Water Resources Investigations Report 98-4204.

Table 4.1-1 Point Source Dischargers to Surface Waters In WMA 2

<u>SUB-WATERSHED</u>	<u>FACILITY NAME</u>	<u>FACILITY TYPE</u>	<u>NJPDES ID NO.</u>	<u>MAP ID NUMBER</u>
Upper Wallkill River				
	Ames Rubber Corporation	Industrial Minor	NJ0085561.001	3
	Accurate Forming Division	Industrial Minor	NJ0002275.001	1
	Southdown Inc (Lime Crest)	Industrial Minor	NJ0035564.001	9
	Tri-County Water Cond. Co	Industrial Minor	NJ0033472.001	15
	Sussex County MUA - Upper Wallkill	Municipal Major	NJ0053350.001	14
	Sparta Twp BOE - High School 1 *	Municipal Minor	NJ0027073.001A	11
	Sparta Twp BOE- High School 2 *	Municipal Minor	NJ0027081.001	12
	Ames Rubber Corporation	Industrial Major	NJ0000141.004B	4
	Sparta Twp - Sparta Plaza	Municipal Minor	NJ0027057.001A	10
Lower Wallkill River				
	Regency At Sussex Apts.	Municipal Minor	NJ0029041.001	8
Pochuck Creek/Black Creek				
	Legends Resort & Country Club	Municipal Minor	NJ0023949.001	6
	Mobil S/S 15-BFQ	Petroleum Cleanup	NJ0132365.001	7
	Vernon Twp BOE	Municipal Minor	NJ0023841.001A	16
	Ames Rubber Corporation	Contact Cooling	NJ0069621.001	2
Papakating Creek				
	High Point Regional High School	Municipal Minor	NJ0031585.001	5
	Sussex Boro MUA [†]	Municipal Minor	NJ0021857	13
* -Because of their close proximity, Sparta Twp. HS #1 and HS #2 share the same location point on the map.				
[†] - Sussex Boro MUA ceased flow 12/26/96. Flow was routed to the Sussex County MUA.				

Table 4.1-2 Permit Violation for Facilities Discharging to Surface Water in WMA 2 Fecal Coliform and Total Phosphorus (1991 - 1999) -						
Permittee	NJPDES No.	Fecal Coliform		Total Phosphorus		
		Violations	Limit	Violation	Limit	
Legends Resort	NJ0023949	none	200/400	none	1mg/l	
Sparta Plaza	NJ0027057	2400 (3/94)	200/400	1.39 (7/98)	1mg/l	
			200/400	1.13 (2/99)	1mg/l	
Spart Twp BOE	NJ0027073	none	200/400		monitor only	
Spart Twp BOE	NJ0027081	900 (6/98)	200/400		no limit	
Regency Apts	NJ0029041	none	200/400		no limit	
High Point High School	NJ0031585	234.9 (2/96)	200/400		no limit	
Sussex County MUA	NJ0053350	none	200/400	none	1mg/l	

Table 4.6-1 Known Contaminated Sites in WMA # 2

MUNICIPALITY	LEVEL *	SITE NAME	ID NO.
FRANKLIN BOROUGH	C1	210 SCOTT ROAD	NJL000046193
FRANKLIN BOROUGH	C1	NJ DEP PARKS & FORESTRY GARAGE	NJL000070458
FRANKLIN BOROUGH	C2	49 ROUTE 23 SOUTH	NJL000058628
FRANKLIN BOROUGH	C2	JOHN & BILLS AUTO REPAIR	NJD986611804
FRANKLIN BOROUGH	C2	MOBIL SERVICE STATION FRANKLIN BOROUGH	NJL600236145
FRANKLIN BOROUGH	C2	EXXON SERVICE STATION FRANKLIN BOROUGH	NJD982792087
FRANKLIN BOROUGH	C2	SPARTAN OIL COMPANY	NJL800027849
FRANKLIN BOROUGH	C2	NJ DIVISION OF PARKS & FORESTRY	NJL800076192
FRANKLIN BOROUGH	C2	STATE PARK SERVICE REGION III OFFICE	NJL800135154
FRANKLIN BOROUGH	C2	HESS SERVICE STATION FRANKLIN BOROUGH	NJD986586022
FRANKLIN BOROUGH	D	BAKING MACHINERY DESIGN COMPANY INC	NJD982738965
FRANKLIN BOROUGH	D	METALTEC AEROSYSTEMS	NJD002517472
FRANKLIN BOROUGH	D	NORTHERN FINE CHEMICAL COMPANY	NJD980529150
FRANKLIN BOROUGH	NA	FRANKLIN TWP REGIONAL MINE CONTAMINATION	NJL000070615
HAMBURG BOROUGH	C1	FALCON RIDGE DEVELOPEMT	NJL800191926
HAMBURG BOROUGH	C1	RIC MAST MOTORS	NJL600195663
HAMBURG BOROUGH	C2	RAIA INDUSTRIES INCORPORATED	NJD986600849
HAMBURG BOROUGH	D	AMES RUBBER CORPORATION	NJD002389468
HAMBURG BOROUGH	D	PLASTOID CORPORATION	NJD040736779

*Definitions:

Remedial Level: Level of site complexity (i.e., to remediate). Based on the Site Remediation Program's 1989 (SRP) Case Assignment Manual.

The intent of the remedial level determinations are to reflect the overall degree of contamination at a site recognizing that individual areas of concern may involve remedial actions of varying levels.

A: Emergency or single phase, short-term cleanup

C1: Single source/single contaminants affecting both soil and groundwater (126 sites);

C2: Multiple sources/contaminants affecting soil/groundwater - moderate (255 sites);

C3: Multiple sources/contaminants affecting soil/groundwater - severe (48 sites);

C4/D: Superfund –severe and complex (29 sites); and

Table 4.6-1 Known Contaminated Sites in WMA # 2 (cont.)

MUNICIPALITY	LEVEL *	SITE NAME	ID NO.
HARDYSTON TOWNSHIP	C1	44 DEER TRAIL	NJL800220410
HARDYSTON TOWNSHIP	C1	YMCA CAMP PATERSON	NJL000048801
HARDYSTON TOWNSHIP	C1	34 WHITE BIRCH TRAIL	NJL800236077
HARDYSTON TOWNSHIP	C1	55 SILVER GROVE ROAD	NJL800259004
HARDYSTON TOWNSHIP	C1	7 HARRISON SHAUGER TERRACE	NJL800019465
HARDYSTON TOWNSHIP	C2	HARDYSTON TOWNSHIP DEPT OF PUBLIC WORKS	NJL000068494
HARDYSTON TOWNSHIP	C2	GULF SERVICE STATION HARDYSTON TOWNSHIP	NJD982796674
HARDYSTON TOWNSHIP	C3	HARDYSTON TOWNSHIP SANITARY LANDFILL	NJL000030130
HARDYSTON TOWNSHIP	C3	LAKE TAMARACK WATER COMPANY WELL 3	NJL000033985
OGDENSBURG BOROUGH	C1	3 RIDGE COURT	NJL800000580
OGDENSBURG BOROUGH	C1	18 LINCOLN AVENUE	NJL800202103
OGDENSBURG BOROUGH	C1	21 PASSAIC STREET	NJL800219974
OGDENSBURG BOROUGH	C1	31 GLENBROOK ROAD	NJL800047268
OGDENSBURG BOROUGH	C1	AAA 330 MAIN STREET	NJL800152993
OGDENSBURG BOROUGH	C2	25 JEFFERSON DRIVE	NJL000052589
OGDENSBURG BOROUGH	C2	15 P HADOWANETZ DRIVE	NJL000067397
SANDYSTON TOWNSHIP	C3	19 MOUNTAIN TRAIL	NJL800012882
SPARTA TOWNSHIP	C1	34 WOODLAWN ROAD	NJL800108391
SPARTA TOWNSHIP	C1	26 HEIGHWOOD TRAIL	NJL800185845
SPARTA TOWNSHIP	C1	13 GRAPHIC BOULEVARD	NJL800133647
SPARTA TOWNSHIP	C1	13 CEDAR FALLS TERRACE	NJL800247116
SPARTA TOWNSHIP	C1	221 STANHOPE ROAD	NJL800027427

Definitions:

Remedial Level: Level of site complexity (i.e., to remediate). Based on the Site Remediation Program's 1989 (SRP) Case Assignment Manual.

The intent of the remedial level determinations are to reflect the overall degree of contamination at a site recognizing that individual areas of concern may involve remedial actions of varying levels.

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C1: Single source/single contaminants affecting both soil and groundwater (126 sites);

C2: Multiple sources/contaminants affecting soil/groundwater - moderate (255 sites);

C3: Multiple sources/contaminants affecting soil/groundwater - severe (48 sites);

C4/D: Superfund -severe and complex (29 sites); and

Table 4.6-1 Known Contaminated Sites

in WMA # 2 (cont.)			
MUNICIPALITY	LEVEL *	SITE NAME	ID NO.
SPARTA TOWNSHIP	C1	J & S PETROLEUM	NJL600057327
SPARTA TOWNSHIP	C1	SPARTA GARDENS	NJL600144356
SPARTA TOWNSHIP	C1	SUSSEX CNTY ASSOC FOR RETARDED CITIZENS	NJL800092793
SPARTA TOWNSHIP	C1	CITGO SERVICE STATION SPARTA TOWNSHIP	NJL800271652
SPARTA TOWNSHIP	C2	SPARTA TOWNSHIP MUNICIPAL BUILDING	NJL600051866
SPARTA TOWNSHIP	C2	CAMP SACAJAWEA	NJL000046771
SPARTA TOWNSHIP	C2	ACME SUPERMARKET	NJL800002685
SPARTA TOWNSHIP	C2	475 WEST SHORE TRAIL	NJL000042309
SPARTA TOWNSHIP	C2	35 ISLAND TRAIL	NJL820000271
SPARTA TOWNSHIP	C2	MIDLANTIC NATIONAL BANK	NJL800053670
SPARTA TOWNSHIP	C2	SHELL SERVICE STATION SPARTA TOWNSHIP	NJL600061279
SPARTA TOWNSHIP	C3	A O POLYMER	NJD030253355
SUSSEX BOROUGH	C1	17 CLOVE AVENUE	NJL800185910
SUSSEX BOROUGH	C1	S & M PONTIAC BUICK OLDSMOBIL GMC TRUCK	NJL800234973
SUSSEX BOROUGH	C1	76 UNIONVILLE AVENUE	NJL800225567
SUSSEX BOROUGH	C1	AGWAY INCORPORATED	NJD986578979
SUSSEX BOROUGH	C1	NJ DEPARTMENT OF CORRECTIONS SUSSEX BORO	NJL800022030
SUSSEX BOROUGH	C1	ROUTE 23 NORTH	NJL800153801
VERNON TOWNSHIP	C1	VERNON TOWNSHIP MUNICIPAL GARAGE	NJD982533614
VERNON TOWNSHIP	C1	11 RIDGE ROAD EAST	NJL800162349
VERNON TOWNSHIP	C1	11 TALLAHATCHIE DRIVE	NJL820001295
*Definitions:			
Remedial Level: Level of site complexity (i.e., to remediate). Based on the Site Remediation Program's 1989 (SRP) Case Assignment Manual.			
The intent of the remedial level determinations are to reflect the overall degree of contamination at a site recognizing that individual areas			
of concern may involve remedial			
actions of varying levels.			
A: Emergency or single phase, short-term cleanup			
C1: Single source/single contaminants affecting both soil and groundwater (126 sites);			
C2: Multiple sources/contaminants affecting soil/groundwater - moderate (255 sites);			
C3: Multiple sources/contaminants affecting soil/groundwater - severe (48 sites);			
C4/D: Superfund -severe and complex (29 sites); and			
Table 4.6-1 Known Contaminated Sites			

in WMA # 2 (cont.)			
MUNICIPALITY	LEVEL *	SITE NAME	ID NO.
VERNON TOWNSHIP	C1	515 TANGLEWOOD DRIVE	NJL000068817
VERNON TOWNSHIP	C1	TEXACO SERVICE STATION VERNON TOWNSHIP	NJL000051557
VERNON TOWNSHIP	C1	491 BUSHWICK LANE	NJL800200073
VERNON TOWNSHIP	C1	PLEASANT VALLEY COUNTRY CLUB INC	NJL800239485
VERNON TOWNSHIP	C1	5 MOUNTAIN TOP COURT	NJL800253700
VERNON TOWNSHIP	C1	6 BLUE HERON TERRACE	NJL800255267
VERNON TOWNSHIP	C1	340 LAKESHORE DRIVE WEST	NJL800166126
VERNON TOWNSHIP	C1	COLDWELL BANKER SCHLOTT REALTORS	NJL800234221
VERNON TOWNSHIP	C2	DOROTHY HENRY MEMORIAL LIBRARY	NJL600246979
VERNON TOWNSHIP	C2	1325 CEDAR TREE DRIVE	NJL800072662
VERNON TOWNSHIP	C2	109 BUSHWICK LANE	NJL000066464
VERNON TOWNSHIP	C2	1 LAKE STREET	NJL000070177
VERNON TOWNSHIP	C2	12 JUNIPER ROAD	NJL800233413
VERNON TOWNSHIP	C2	MOBIL SERVICE STATION VERNON TOWNSHIP	NJD986604734
VERNON TOWNSHIP	C2	ROUTE 515 ISLAND TRANSPORTATION	NJL820003226
VERNON TOWNSHIP	C2	VERNON GARAGE	NJL600238877
VERNON TOWNSHIP	D	BARRIER CHEMICAL INDUSTRIES	NJD980206130
*Definitions:			
Remedial Level: Level of site complexity (i.e., to remediate). Based on the Site Remediation Program's 1989 (SRP) Case Assignment Manual.			
The intent of the remedial level determinations are to reflect the overall degree of contamination at a site recognizing that individual areas			
of concern may involve remedial			
actions of varying levels.			
A: Emergency or single phase, short-term cleanup			
C1: Single source/single contaminants affecting both soil and groundwater (126 sites);			
C2: Multiple sources/contaminants affecting soil/groundwater - moderate (255 sites);			
C3: Multiple sources/contaminants affecting soil/groundwater - severe (48 sites);			
C4/D: Superfund –severe and complex (29 sites); and			
Table 4.6-1 Known Contaminated Sites in WMA # 2 (cont.)			
MUNICIPALITY	LEVEL *	SITE NAME	ID NO.
WANTAGE TOWNSHIP	C1	WANTAGE TOWNSHIP MUNICIPAL BUILDING	NJL000054205
WANTAGE TOWNSHIP	C1	ROUTE 519 & ROUTE 23	NJL000068825

WANTAGE TOWNSHIP	C1	EXXON SERVICE STATION WANTAGE TOWNSHIP	NJL800134314
WANTAGE TOWNSHIP	C1	COUNTY CONCRETE CORPORATION	NJD986601144
WANTAGE TOWNSHIP	C1	TENNESSEE GAS PIPELINE	NJL800082083
WANTAGE TOWNSHIP	C1	29 SHERMAN RIDGE ROAD	NJL800259863
WANTAGE TOWNSHIP	C1	CARNEGIE INDUSTRIES	NJD980771505
WANTAGE TOWNSHIP	C1	12 GLENN ROAD	NJL800097479
WANTAGE TOWNSHIP	C1	TENNESSEE GAS PIPELINE	NJD982531451
WANTAGE TOWNSHIP	C1	1547 ROUTE 565	NJL800249559
WANTAGE TOWNSHIP	C1	VORELAND PROPERTY	NJL000042663
WANTAGE TOWNSHIP	C2	AMES RUBBER CORPORATION	NJD000818518
WANTAGE TOWNSHIP	C2	SUSSEX AIRPORT INCORPORATED	NJL600017107
WANTAGE TOWNSHIP	C2	MOBIL SERVICE STATION WANTAGE TOWNSHIP	NJD986606010
WANTAGE TOWNSHIP	C2	IKES CAR WASH & DISCOUNT GAS	NJL600046429
WANTAGE TOWNSHIP	C2	REGENCY AT SUSSEX APARTMENTS	NJD000549501
WEST MILFORD TOWNSHIP	C1	99 BAYONNE DRIVE	NJL800256992
WEST MILFORD TOWNSHIP	C2	WEST MILFORD PUBLIC WORKS DEPOT	NJL820001618
*Definitions:			
Remedial Level: Level of site complexity (i.e., to remediate). Based on the Site Remediation Program's 1989 (SRP) Case Assignment Manual.			
The intent of the remedial level determinations are to reflect the overall degree of contamination at a site recognizing that individual areas			
of concern may involve remedial actions of varying levels.			
A: Emergency or single phase, short-term cleanup			
C1: Single source/single contaminants affecting both soil and groundwater (126 sites);			
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C3: Multiple sources/contaminants affecting soil/groundwater - severe (48 sites);			
C4/D: Superfund –severe and complex (29 sites); and			

Table A5.1: Drainage Area and Land Uses above Benthic Macroinvertebrate Sampling Stations

Site	NJIS98	Habitat	Area mi	%Urb-95 mi	%ISC	Ag%	FOR %	WET %	WAT %
AN0309A	30	196	8.12	7.43	3.31	10.77	63.73	15.95	2.12
AN0303	30	193	2.27	6.74	3.63	27.57	51.27	14.10	0.32
AN0305	27	184	5.00	9.09	3.80	30.05	49.32	10.86	0.68
AN0302	21	156	60.59	19.19	6.53	13.27	51.38	11.67	4.49
AN0306	21	190	11.26	13.61	4.74	31.30	43.16	10.60	1.32
AN0297	21	191	6.76	42.24	13.28	1.18	33.63	4.56	18.38
AN0301	21	141	5.86	7.44	2.72	33.25	49.92	8.75	0.63
AN0294	21	164	4.29	0.22	0.96	0.00	78.02	20.49	1.26
AN0295	21	135	not available						
AN0299	18	174	39.91	22.20	7.41	8.37	51.75	11.43	6.25
AN0307	18	90	37.07	9.63	3.66	35.16	42.32	11.88	1.01
AN0298	18	142	19.41	27.68	9.06	2.28	50.52	10.75	8.77
AN0308	18	167	4.60	8.72	3.24	38.94	37.32	14.53	0.49
AN0300	15	163	45.96	20.97	6.99	8.95	52.83	11.53	5.72
AN0309	15	113	19.35	9.63	3.67	26.56	48.60	13.71	1.49
AN0304	12	122	15.89	8.21	3.31	39.72	38.99	12.63	0.45
AN0296	9	148	17.24	23.57	5.70	14.10	47.87	12.80	1.66

NJIS: New Jersey Impairment Score

Habitat: Habitat Assessment Score

Area: Estimated drainage area above AMNET monitoring point

%URB-95: OSP New Urban coverage, based on 95-97 aerial photography

%ISC: Estimated Impervious Surface Coverage based on buffered roads and non-road impervious area

Ag %: Percent Agricultural Land Use in AMNET Drainage Area, 1995-97 estimate

For %: Percent Forest Land Cover in AMNET Drainage Area, 1995-97 estimate

Wet %: Percent Wetland Land Cover in AMNET Drainage Area, 1995-97 estimate

Wat %: Percent Water in AMNET Drainage Area, 1995-97 estimate

Data provided courtesy of M. Ayers USGS LI-NJ NAWQA Program

Table 5.1-1 Stream Classifications of Waterways in WMA 02 Subdivided by Land Classes

CATEGORY	LAND CLASS	LENGTH (miles)	PERCENTAGE
FW1	1	1.37	10.25
FW1	4	1.06	7.97
FW1	5	0.08	0.57
FW1	6	0.00	0.02
FW1	8	10.83	81.20
FW1-Trout Maintenance	4	0.01	0.51
FW1-Trout Maintenance	8	1.76	99.49
FW1-Trout Production	4	0.07	1.04
FW1-Trout Production	5	0.01	0.14
FW1-Trout Production	8	6.69	98.81
FW2-Non Trout	1	14.75	6.26
FW2-Non Trout	2	33.45	14.20
FW2-Non Trout	4	93.79	39.81
FW2-Non Trout	5	49.57	21.04
FW2-Non Trout	6	35.30	14.98
FW2-Non Trout	7	0.59	0.25
FW2-Non Trout	8	8.12	3.45
FW2-Non Trout Cat 1	1	0.18	0.82
FW2-Non Trout Cat 1	2	0.29	1.35
FW2-Non Trout Cat 1	4	3.46	15.93
FW2-Non Trout Cat 1	5	0.74	3.41
FW2-Non Trout Cat 1	6	1.91	8.79
FW2-Non Trout Cat 1	7	0.05	0.22
FW2-Non Trout Cat 1	8	15.11	69.49
FW2-Trout Maintenance	1	7.42	8.47
FW2-Trout Maintenance	2	9.99	11.41
FW2-Trout Maintenance	4	52.44	59.87
FW2-Trout Maintenance	5	9.07	10.35
FW2-Trout Maintenance	6	8.67	9.90
FW2-Trout Maintenance Cat 1	8	6.30	100.00
FW2-Trout Production Cat 1	1	2.94	13.03
FW2-Trout Production Cat 1	2	1.45	6.42
FW2-Trout Production Cat 1	4	9.44	41.87
FW2-Trout Production Cat 1	5	0.89	3.95
FW2-Trout Production Cat 1	6	0.31	1.39
FW2-Trout Production Cat 1	8	7.52	33.34

Note:

Land Classes

1 - Urban

2 - Agriculture

4 - Forest

5 - Wetland

6 - Water

7 - Barren

8 - Open Space

